I. AMENDMENTS TO THE CLAIMS:

Kindly amend claims 1, 18 and 19 as follows.

The following Listing of Claims replaces all prior listings, or versions, of claims in the above-captioned application.

LISTING OF CLAIMS:

1. (Currently Amended) A method for water hammerless opening of a fluid passage, comprising the steps of:

(a) providing a fluid passage openable by operation of an actuator operating type valve provided on the fluid passage of a pipe passage, wherein the fluid passage has a nearly constant pressure inside the pipe passage;

(b) moving a valve body of the actuator operating type valve from a state of full closing toward a direction of valve opening to a first degree of valve opening by increasing or decreasing driving input to an actuator of the actuator operating type valve, wherein the driving input is increased or reduced to a first prescribed set value in order to prevent a water hammer in the fluid passage;

(c) holding the driving input to the actuator at the first set value for a first period of time; and then

(d) further increasing or decreasing the driving input to move the valve body from the first degree of valve opening to a state of full valve opening so the fluid passage is opened without causing a water hammer.

2. (Previously Presented) A method for water hammerless opening of a fluid passage as claimed in Claim 1, wherein the valve is a normally closed and pneumatic pressure operating

type diaphragm valve or a normally open and pneumatic pressure operating type diaphragm valve, wherein the diaphragm valve is a fixed capacity type diaphragm valve wherein an inner capacity of the diaphragm valve is fixed and does not change when the valve is operated.

3. (Previously Presented) A method for water hammerless opening of a fluid passage as claimed in Claim 1, wherein the first period of time is less than 1 second, and a pressure rise value of the fluid passage is made to be within 10% of a first steady state pressure value before opening the valve.

4. (Withdrawn) A device for water hammerless opening of a fluid passage, comprising:

(a) a valve comprising a valve body;

(b) an actuator disposed to drive the valve body;

(c) a vibration sensor removably fixed to a pipe passage on an upstream side of the valve;

(d) an electro-pneumatic conversion control device disposed to receive a valve opening/closing command signal input, wherein the electro-pneumatic conversion control device comprises a data storage part, wherein an actuator operating pressure Pa inputted to the actuator is controlled by a control signal Sc stored in advance in the data storage part; and

(e) a computation control device comprising a comparison computation circuit, wherein the comparison computation circuit is disposed to receive as input a vibration detecting signal Pr from the vibration sensor, a step pressure setting signal Ps to be supplied to the actuator, a step pressure holding time setting signal Ts, and a permissible upper limit vibration pressure setting signal Prm, and wherein the comparison computation circuit

compares the vibration detecting signal Pr and the permissible upper limit vibration pressure setting signal Prm, and the step pressure setting signal is adjusted by the comparison computation circuit so that the control signal Sc is outputted by the comparison computation circuit to the data storage part of the electro-pneumatic conversion control device, wherein the control signal Sc comprises the holding time setting signal Ts and the adjusted step pressure setting signal Ps.

5. (Withdrawn) A device for water hammerless opening of a fluid passage as claimed in Claim 4, wherein the computation control device further comprises a step pressure setting circuit, a holding time setting circuit, a permissible upper limit vibration pressure setting circuit, a vibration pressure detecting circuit and the comparison computation circuit; and when the vibration detecting signal Pr exceeds the permissible upper limit vibration pressure setting signal Prm immediately after an actuator operating signal is step-changed, the step pressure setting signal Ps is adjusted toward a rising direction, and when the vibration detecting signal Pr exceeds the permissible upper limit vibration pressure setting signal Prm immediately after the actuator operating pressure Pa is made to zero from the intermediate step operating pressure, the step pressure setting signal Ps is adjusted toward a lowering direction.

6. (Withdrawn) A device for water hammerless opening of a fluid passage as claimed in Claim 4, wherein the electro-pneumatic conversion device comprises the data storage part that stores the control signal Sc from the computation control device, a signal conversion part, and an electro-pneumatic conversion part, wherein an actuator operating pressure control signal Se is outputted from the signal conversion part to the electro-pneumatic

conversion part based on a control signal Sc' stored in advance in the data storage part so that the pipe passage is opened without causing a water hammer.

7. (Withdrawn) A device for water hammerless opening of a fluid passage, comprising:

(a) an actuator operating type valve installed on a fluid passage;

(b) an electro-pneumatic conversion device disposed to supply a 2-step actuator operating pressure Pa to the actuator operating type valve;

(c) a vibration sensor removably fixed to the pipe passage on an upstream side of the actuator operating type valve; and

(d) a tuning box disposed to receive as input a vibration detecting signal Pr detected through the vibration sensor and to output to the electro-pneumatic conversion device a control signal Sc to control a step operating pressure Ps' of the 2-step actuator operating pressure Pa, wherein the tuning box adjusts the control signal Sc so that output from the electro-pneumatic conversion device of the 2-step actuator operating pressure Pa comprising the step operating pressure Ps' makes the vibration detecting signal Pr nearly zero.

8. (Cancelled)

9. (Cancelled)

10. (Previously Presented) A method for water hammerless opening of a fluid passage as claimed in Claim 18, wherein the vibration sensor and the tuning box are removeable, and are removed after the control signal Sc data at a time of outputting the 2-step operating pressure Pa, with which generation of vibration is nearly zero, are inputted to a memory storage of the electro-pneumatic conversion device.

11. (Previously Presented) A method for water hammerless opening of a fluid passage as claimed in Claim 18, wherein the vibration sensor is provided at a position on the upstream side within 1000mm from where the actuator operating type valve is installed on the fluid passage.

12. (Previously Presented) A method for water hammerless opening of a fluid passage as claimed in Claim 18, wherein a step operating pressure holding time t of the 2-step operating pressure Pa is set at less than 1 second.

13. (Withdrawn) A method for supplying a chemical solution, comprising the steps of:

(a) supplying a fluid to a fluid passage on a downstream side of an actuator operating type valve installed on the fluid passage by opening the fluid passage using the actuator operating type valve, wherein the fluid passage has a nearly constant internal pressure therein, and the fluid is a chemical solution; wherein opening of the fluid passage includes the steps of

i. firstly, moving a valve body of the actuator operating type valve toward a direction of valve opening by increasing or decreasing a driving input to an actuator to the prescribed set value, wherein the actuator is operably connected to the actuator operating type valve; and

ii. secondly, holding the actuator driving input at the set value for a first period of time; and

thirdly, further increasing or decreasing the driving input to move the valve body of the valve to a state of full opening so that a water hammer does not occur at the time the valve is opened.

14. (Withdrawn) A method for supplying a chemical solution as claim in Claim 13, wherein the first period of time is less than 1 second.

15. (Previously Presented) A method for water hammerless opening of a fluid passage as claimed in Claim 19, wherein the vibration sensor and the tuning box are removeable, and are removed after the control signal Sc data at a time of outputting the 2-step operating pressure Pa, with which generation of vibration is nearly zero, are inputted to a memory storage of the electro-pneumatic conversion device.

16. (Previously Presented) A method for water hammerless opening of a fluid passage as claimed in Claim 19, wherein the vibration sensor is provided at a position on the upstream side within 1000mm from where the actuator operating type valve is installed on the fluid passage.

17. (Previously Presented) A method for water hammerless opening of a fluid passage as claimed in Claim 19, wherein a step operating pressure holding time t of the 2-step operating pressure Pa is set at less than 1 second.

18. (Currently Amended) A method for water hammerless opening of a fluid passage, comprising the steps of:

(a) providing a fluid passage openable by operation of an actuator operating type valve provided on the fluid passage of a pipe passage, wherein the fluid passage has a nearly constant pressure inside the pipe passage;

(b) moving a valve body of the actuator operating type valve toward a full~~direction of~~ valve opening state by increasing or decreasing driving input to an actuator of the actuator operating type valve, wherein the driving input is increased or reduced to a first prescribed set value thereby partially opening the actuator operating type valve;

(c) holding the driving input to the actuator at the first set value for a first period of time; and then

(d) further increasing or decreasing the driving input to move the valve body to the~~a~~ state of full valve opening so the fluid passage is opened ~~without causing a water hammer; (e) opening the fluid passage~~, wherein the fluid passage has a vibration sensor removably fixed on an upstream side of the actuator operating type valve installed on the fluid passage;

(e)~~(f)~~ inputting a vibration detecting signal Pr from the vibration sensor to a tuning box when opening the fluid passage; and then,

(f)~~(g)~~ inputting a first control signal Sc from the tuning box to an electro-pneumatic conversion device; and

(g)~~(h)~~ generating a first 2-step actuator operating pressure ~~Pa~~ in the electro-pneumatic conversion device when the first control signal Sc is inputted, wherein the first 2-step actuator operating pressure includes an initial intermediate step operating pressure Ps', and supplying the first 2-step actuator operating pressure ~~Pa~~ to the~~an~~ actuator operably connected to the actuator operating type valve so that the actuator operating type valve is made to open in a 2-step operation, wherein the first 2-step actuator operating pressure ~~Pa~~ to be supplied to the actuator and the vibration detecting signal are compared for a relative relationship of the two, and when vibration is generated at a time when a first step actuator operating pressure Pa rises, the initial intermediate~~a~~ step operating pressure Ps' is lowered, and when vibration is generated at a time when a second step actuator operating pressure Pa rises, the initial

intermediate step operating pressure Ps' is raised, so that a second~~and the~~ intermediate step operating pressure Ps' is determined so as to make the vibration detecting signal Pr nearly zero, wherein the second intermediate step operating pressure Ps' ~~of the step operating pressure Pa, to make the vibration detecting signal Pr nearly zero,~~ is determined by repeating a plurality of preliminary adjustments of raising or lowering ~~the~~ intermediate step operating pressure Ps' so that the actuator operating type valve is made to open based on second control signal Sc data that corresponds to a second~~when the~~ 2-step operating pressure ~~Pa~~ that includes~~of~~ the second intermediate step operating pressure Ps', wherein the second control signal Sc data~~to make generation of vibration nearly zero,~~ is then outputted from the electro-pneumatic conversion device to control movement of the valve body without causing a water hammer because generation of vibration in the fluid passage is nearly zero.

19. (Currently Amended) A method for water hammerless opening of a fluid passage, comprising the steps of:

(a) providing a fluid passage openable by operation of an actuator operating type valve provided on the fluid passage of a pipe passage, wherein the fluid passage has a nearly constant pressure inside the pipe passage;

(b) moving a valve body of the actuator operating type valve toward a full~~direction of~~ valve opening state by increasing or decreasing driving input to an actuator of the actuator operating type valve, wherein the driving input is increased or reduced to a first prescribed set value thereby partially opening the actuator operating type valve;

(c) holding the driving input to the actuator at the first set value for a first period of time; and then

(d) further increasing or decreasing the driving input to move the valve body to a state of full valve opening so the fluid passage is opened ~~without causing a water hammer;~~ ~~(e) opening the fluid passage~~, wherein the fluid passage has a vibration sensor removably fixed on an upstream side of the actuator operating type valve installed on the fluid passage;

(e)~~(f)~~ inputting a vibration detecting signal Pr to a tuning box when opening the fluid passage; and then,

(f)~~(g)~~ inputting a first control signal Sc from the tuning box to an electro-pneumatic conversion device; and

(g)~~(h)~~ generating a first 2-step actuator operating pressure ~~Pr~~ in the electro-pneumatic conversion device ~~the~~ when the first control signal Sc is inputted, wherein the first 2-step actuator operating pressure includes an initial intermediate step operating pressure Ps', and supplying the first 2-step actuator operating pressure ~~Pa~~ to the~~an~~ actuator operably connected to the actuator operating type valve so that the actuator operating type valve is made to open in a 2-step operation, wherein the first 2-step actuator operating pressure Pa to be supplied to the actuator and the vibration detecting signal Pr are compared for a relative relationship of the two, and when vibration is generated at a time when a first step actuator operating pressure Pa drops, the initial intermediate~~a~~ step operating pressure Ps' is raised, and when vibration is generated at a time when a second step actuator operating pressure Pa drops, the initial intermediate step operating pressure Ps' is lowered, so that a second~~and the~~ intermediate step operating pressure Ps' is determined so as to make the vibration detecting signal Pr nearly zero, wherein the second intermediate step operating pressure Ps'~~of the 2-step operating pressure Pa, to make the vibration detecting signal Pr nearly zero,~~ is determined by repeating a plurality of preliminary adjustments of raising or lowering ~~the~~ intermediate step operating pressure Ps' so that the actuator operating type valve is made to

open based on second control signal Sc ~~SC~~ data that corresponds to a second ~~when the~~ 2-step operating pressure that ~~Pa~~ includes ~~of~~ the second intermediate step operating pressure Ps', wherein the second control signal Sc data ~~to make generation of vibration nearly zero,~~ is then outputted from the electro-pneumatic conversion device to control movement of the valve body without causing a water hammer because generation of vibration in the fluid passage is nearly zero.